2. On Two Species of Bats inhabiting New Zealand. By Robert F. Tomes.

(Mammalia, Pl. LIII., LIV.)

The first notice of the occurrence of *Cheiroptera* in New Zealand was given by Forster in 1772–74 *, who recorded the occurrence of a Bat flying over the sea-shore near the margin of a wood in the estuary of Queen Charlotte. It was shot, but being struck only in the wing, lived for two days. "He was described by me," says he, "and was drawn by my son." To this species Forster gave the name of *Vespertilio tuberculatus*. The description has been published in the work noted below, and the drawing is now in the British Museum. I shall have occasion to refer to both the description and the figure.

In 1843 Dr. Gray gave a very condensed description of a Bat in the Appendix to Dieffenbach's Travels in New Zealand, which he, believing to be the species mentioned in the MSS. of Forster, called by the same specific name. As Dr. Gray had specimens for examination, he at once perceived that they could by no means be considered as representatives of the genus *Vespertilio*, and that they did not even belong to the same family. Accordingly we find them in the 'Catalogue of the Mammalia of the British Museum,' published in 1843, placed in the Family *Noctilionina*, with the new generic appellation *Mystacina*, the old specific name *tuberculata* being retained.

Having some time since had occasion to examine some species of Bats in the Museum of the College of Surgeons, Prof. Quekett showed me one which had been recently received from New Zealand. It was not until I had been assured that it came directly from that country, in a bottle with a collection of New Zealand insects, that I could be persuaded that no mistake as to locality had been made. The forms presented by this example were so entirely unlike those of the only New Zealand species with which I was acquainted, that it was with considerable surprise I beheld a bat having pretty much the same forms and proportions as the common little English *Pipistrelle*.

Shortly afterwards an opportunity occurred of inspecting the fine collection of *Cheiroptera* in the Leyden Museum, which contains three examples of this supposed new species, but without any specific name. Finally, I detected other examples in the British Museum, amounting in number to five.

Being then satisfied of the existence of two species of Bats in New Zealand, I was anxious to pursue the subject further, and to determine, if possible, to which of these Forster had given the name of *V. tuberculatus*. The kindness of Dr. Gray speedily placed in my hands all the necessary materials. There could be no hesitation; the supposed new species was undoubtedly the one from which

* Descriptiones animalium in itinere ad maris australis terras per annos 1772–74 suscepto observatorum, edidit H. Lichtenstein. 1844.

Forster's drawing had been made, whilst the description, indicating the number of incisors, and other peculiarities, pointed unequivocally to the same conclusion.

As the above-mentioned zoologists have certainly been the first describers of two distinct animals, the names imposed by them will of course be retained; but it is much to be regretted that their specific names are similar; and the more so, as the one most recently given was clearly intended as a reference to the earlier known species.

The following description has been taken from the specimen in the College of Surgeons, and also from the specimens in the British Museum. With the advantages of specimens in spirit and in skin, it is probable that the description will be found tolerably correct, both as regards the form of the face, ears, &c., and the quality and colour of the fur.

Fam. Vespertilionina.

1. Scotophilus tuberculatus, Forster, Descript. Anim. p. 63. 1772-74, Icon. ined. in Brit. Mus. t. 1. (Pl. LIII.)

In form and proportions somewhat resembling the Pipistrelle *of Europe; in size resembling* Vesp. Nattereri*; in colour very nearly similar to the* Scotophilus Gouldii *of Australia.*

The muzzle is rather broad and obtuse, and moderately hairy. The nostrils are tumid, and of an oval form, with their inner margins more prominent than their outer, giving them a sublateral opening; they are distant from each other about two lines. The forehead is rather flat. The lower lip is broad, with the extreme edge naked, and rather thickly clothed with short hair on the chin, which becomes very thick on the throat. Immediately within the *symphysis menti* is a small but distinct wart.

The ears are rather small, oval-triangular, with a pretty uniform outline, and with a kind of plait or crease on the basal front of the inner margin, giving that part of the ear a slightly projecting lobe, not however of sufficient magnitude to interfere materially with its general uniformity of outline. The outer margin is not hollowed out, but maintains a pretty regular curve, and has its basal portion brought forward, in the form of a narrow rudiment of membrane, on to the cheek, where it ends immediately under the eye.

The tragus is short, rather broad, and of nearly uniform breadth, with the end round. It has, as in all the other species of this restricted group, an inward curvature.

The wing-membranes spring from the base of the toes, and the latter occupy about half the length of the entire foot. The *os calcis* extends one-third of the distance from the foot to the tip of the tail, which has its extreme tip free.

The face is furnished with some tufts and lines of bristly hair. Immediately in front of the eye may be noticed a tuft, consisting of a few hairs, and on the gland of the upper lip is a similar one. From behind the nostril proceeds a narrow band of fine bristly hairs,

which curves downwards and backwards on the lip for a short distance, and then taking an upward curvature, passes in front of the eye, and is lost in the fur of the forehead.

All the membranes, both above and below, have those parts contiguous to the body, hairy, especially the interfemoral, on which it extends more markedly than elsewhere. The part of the latter membrane which is destitute of hair, is smooth, and has about ten transverse strongly dotted lines.

Over the whole of the body the fur is very thick, soft, and rather long. On the top of the head it is long enough to obscure the basal half of the ears, and thus give the appearance of an elevated crown.

Everywhere the hair is unicoloured, and of a black-brown colour on the head and back, passing into chestnut-brown on the rump. Beneath it is similar in colour, but more strongly tinged with brown, especially towards the pubal region, where it is reddish-brown.

On examining the cranium, I find that its chief peculiarity consists in its extreme shortness in relation to its other dimensions. In this respect it more nearly resembles the cranium of *Lasiurus novebora-censis* than that of any other species of bat I have yet seen, but it is even shorter than in that species. In its general conformation it bears considerable resemblance to that of the common *Pipistrelle* of Europe, especially in the degree of elevation of the cerebral region; but the arrangement of the dental series is more like that of the *Noctule Bat* than that of the *Pipistrelle*, but bears a still greater resemblance to that of the *Scotophilus Gouldii* of Australia. Thus, on examining the teeth of the upper jaw, they are seen to be arranged in two *straight* lines which are nearly parallel, the incisors only deviating from these lines, being placed across the front of the space enclosed by them. This enclosed space—constituting the anterior part of the palate—is nearly a parallelogram, being but slightly narrower in front than posteriorly. Its length to its breadth is as one and a quarter to one.

The range of the teeth in the lower jaw must, of course, bear exact relation to that of the upper *, varying only in the number of the teeth and their individual form.

* It will not be out of place here to remark, that this expression applies exclusively to the normal state of dentition of animals in a state of nature. The reverse of this may occasionally be seen in accidental varieties or malformations, and frequently in domesticated animals, where a great change in the form of the jaws and teeth has often resulted from long-continued selection of individuals from which to produce a breed for some special purpose, which selection may have been further assisted by a constant training to the purpose for which the breed was designed. This must certainly be the case with some of the varieties of dogs. In the bull-dog, for instance, we find a most remarkable development of lower jaw, attended with an equally distorted arrangement of the teeth. It is scarcely necessary to allude to the singular appearance often observable in the front teeth of the human species, under- or over-lapping each other, as the case may be, and displaying every degree of intermediate arrangement. But these deviations from the normal state of dentition in no way affect the statement above made respecting the relation of the inferior to the superior maxilla, and their implanted teeth.

The number of the teeth is as follows :—

In. $\frac{2-2}{6}$; Can. $\frac{1-1}{1-1}$; Pre. Mol. $\frac{1-1}{2-2}$; Mol. $\frac{3-3}{3-3}=\frac{14}{18}$.

The upper incisors are arranged in pairs, of which the inner one of each pair is much larger than the outer one. They are all somewhat elongated, conical, and pointed, and when viewed in front are seen to have their points directed inwards, but when seen laterally have nearly a vertical direction, similar in this respect to the canines. A considerable interval separates them on each side from the latter teeth, and this, with their regular conical outline and nearly vertical position, constitute their chief peculiarities. In the centre, between the inner ones, is a considerable opening, caused by the non-development of the anterior margins of the intermaxillary bones, and the notch in the front of the palate, just as in the *Noctule Bat* and most other true *Vespertilionidæ*. The other teeth in the upper jaw present no deviations from what is usual in the genus.

In the lower jaw the incisors are of the form ordinarily observed in this genus; they are symmetrically arranged and trilobed. The canines present no marked peculiarities of form. The premolars are small, pointed, and have their basal cusps less developed than those of the corresponding teeth in the *Noctule Bat*. The first of these teeth is much the smaller of the two. The molars differ in no respect from those of the above-mentioned species, excepting that their cusps are perhaps somewhat longer and more pointed.

In the following Table of dimensions, the first column represents the measurements of the specimen in spirit in the Museum of the College of Surgeons, before alluded to, and the other columns have been taken from specimens in skin in the British Museum :—

	No. 1.		No. 2.		No. 3.		No. 4.	
	″	‴	″	‴	″	‴	″	‴
Length of the head and body..	2	1						
——— of the tail	1	7	1	6				
——— of the head.....	0	$7\frac{1}{2}$						
——— of the ears	0	$3\frac{1}{2}$						
——— of the tragus	0	$1\frac{3}{4}$						
——— of the fore-arm	1	6	1	6	1	6	1	6
——— of the longest finger ..	2	8	2	10	2	8	2	7
——— of the fourth finger ..	1	10	1	10	2	0	2	0
——— of the thumb.....	0	$2\frac{1}{2}$	0	$3\frac{1}{4}$	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$
——— of the foot and claws..	0	$3\frac{3}{4}$	0	4	0	4	0	$4\frac{1}{2}$
Expanse of wings	10	9	10	4				

The foregoing description had been taken with a view to its publication, before that of Forster had been examined, the impression at that time being that the species was new.

For the convenience of immediate comparison, and to show the general similarity of the two descriptions, a condensed description will now be given of that furnished by Forster.

About the size of *Vesp. communis*, or a little larger; the head like that of a mouse, and of medium size; snout blunt, emarginate,

simple, with bi-tuberculated nostrils. The lower jaw rather shorter than the upper.

Incisors in the upper jaw 4, in pairs, of which the two inner ones are the larger; the two outer ones smaller, and approximate to them. In the lower jaw 6, very small and approximate. *Laniares* (?) $\frac{1-1}{3-3}$; molars $\frac{4-4}{4-4}$.

Ears moderate, smooth, subovate; tragus semiorbicular. Wings large and dark brown. The fur everywhere soft, fine, and rusty brown.

Length from the end of the nose to the root of the tail	2 inches.
Length of the tail	$1\frac{3}{10}$ „
Expanse of wings	$10\frac{1}{2}$ „

Fam. Noctilionina.

Genus Mystacina, Gray.

Body very short and broad. Snout much produced; nostrils sublateral, surrounded by a thickened projecting rim. Under jaw much shorter than the end of the nose. Top of the head considerably elevated; ears lateral, simple; tragus long, narrow, and pointed. Wings moderate; thumb moderate. Index finger with two phalanges, second finger with *four*, third and fourth fingers with three, each. Wing-membranes extending to the distal extremity of the tibia. Legs and feet short and stout. Tail very short, piercing the interfemoral membrane near to its base, and projecting on the upper surface of it, as in *Taphozous*. Interbrachial membrane, a narrow piece of membrane beneath the fore-arm, that adjoining the sides of the body, and that enclosing the tibia, as well as the basal portion of the interfemoral membrane, thick and leathery, with numerous deep wrinkles or corrugations on its upper surface. Incisors, two in the upper jaw, large, contiguous, and shaped like canines; in the lower jaw two, small, and placed in front of the canines.

1. Mystacina tuberculata, Gray. (Pl. LIV.)

Mystacina tuberculata, Gray, Cat. Mam. Brit. Mus. p. 34, 1843; Gray in Deiffenb. Journ. App. p. 296, 1843; Gray, Zool. Voy. Sulphur, No. II. p. 23, 1843; Zool. Voy. Erebus and Terror, No. IV. pl. 22. 1844.

The snout of this singular-looking species is considerably elongate d with the end of the nose emarginate between the nostrils, which are very prominent, and directed sublaterally. The mouth is placed far back in relation to the nose, and a space intervenes between the two, which is clothed with very fine short hairs. The hairiness and form of this space are somewhat similar to the same part in the *Coati Mondi*. No very strongly-marked peculiarity is observable in the mouth itself, but it is rather small, and has only the extreme edges of the lips destitute of hair.

The top of the head is convex, rounding off on every side, and the space between it and the end of the nose, *i. e.* the face, is concave in its longitudinal direction, but not transversely, as in *Taphozous*.

The ears are lateral, and remarkably simple in form. Instead of the forward extension on the side of the face, so usual in the insectivorous species of this order, they are attached precisely as in the fruit-eating species, *i. e.* just as we may observe them in a *dog* or *cat*. In form they are regularly oval, and slightly pointed. The tragus is straight, narrow, and pointed, reaching to the middle of the ear.

The wings are rather broad, and of medium length. The thumb is of moderate size, with the basal joint very short; the index finger is composed of two phalanges, the terminal one being very minute. The second finger has *four* phalanges, and the third and fourth fingers have three each. The presence of four phalanges in the second finger, instead of the usual number of three, in this family, will be again adverted to. The wing-membranes barely extend to the distal extremity of the tibia.

The legs and feet are very short and stout, as in the genus *Molossus*. The heel-cartilage is of medium length and substance, and the interfemoral membrane is rounded at its posterior margin, and is perforated near its base by the tail, which is short, and exhibits its terminal half free above the membrane, as in the genus *Taphozous*.

The portions of membrane contiguous to the fore-arm, the sides of the body and the tibia, are very thick and leathery, with numerous deep wrinkles, and the basal half of the interfemoral membrane (as far as to where the tail becomes free) possesses the same peculiarity. The wrinkles, in many places, cross the legs and fore-arms, but they are only observable on the *upper* surfaces of the membranes and limbs. This singular part of the cutaneous system is marked by a regular and decided outline, and can scarcely be said at any place to graduate into the smooth membrane of the wings. Its extent is pretty well indicated by the hairy portions of the membranes in the genus *Lasiurus*, excepting that it only occupies one-half of the interfemoral membrane.

In its general character, the fur is short, crisp and thick, having a grizzly shining appearance, very similar to that of some of the *Soricidæ*. That of the head extends towards the nose, and covers the whole of the face, being bounded anteriorly by a frill of stiff upright hairs; that commencing near the corner of the mouth extends upwards in front of the eye, and meets on the top of the nose with the corresponding part of the other side of the face. On all the upper parts of the body the fur is similar. It is dusky at its base, and tipped for half its length with shining grey-brown, having a slight tinge of olive. Beneath, the fur is brown at its base, with shining tips of grey-brown. The fur of the throat extends to the chin and under lip, and densely covers the whole, excepting the extreme edge of the lip.

The whole of the cutaneous system is very dark-brown, with the exception of the wrinkled part already mentioned, which is paler, and tinged with yellowish.

The cranium exhibits some peculiarities worthy of note. Viewed from above, the cerebral portion is seen to be about as much arched as that of *Vesp. Nattereri*, and has a faint sagittal crest towards the occipital region. Also there is a moderately pronounced occipital crest, which becomes more strongly developed in the vicinity of the acoustic elements of the skull. The auditory bullæ have much the same form and proportion as the same parts in *Vesp. Nattereri*, and the facial portion of the skull is proportioned much as in that species. The orbital openings are of very moderate size, and the zygoma but little arched, and very slender. The bony palate terminates a little posteriorly to the last molar. The nasal opening is small, and the intermaxillary bones meet in front, for the support of the contiguous incisors, as in *Miniopteris* and *Furipterus* among the *Vespertilionina*, and *Molossus*, *Rhinapoma*, and *Noctilio* among the *Noctilionina*.

The incisors in the upper jaw are two in number, large, conical, and pointed. They are provided with a distinct *cingulum*, visible in front, which passes into a well-marked basal lobe, or cusp, behind the tooth. As the incisors are situated very near to the canines, and are themselves in contact, this lobe is only visible when seen directly from behind. The incisive foramina are two in number and very minute. The canines are long, pointed, and triangular, without any basal lobe. The next two teeth in the upper jaw present the same forms which usually characterize the premolars in the insectivorous *Cheiroptera* ; and the three remaining teeth, *i. e.* the molars, may be similarly passed over.

The hinder part of the lower jaw is formed very similarly to the same part in the genus *Vespertilio*, but has the *posterior process* less produced. Another point of difference occurs in the form of a somewhat rounded *posterior angle*, something like that observable in *Furipterus*, but more nearly resembling the same part in the jaw of the *Ursus labiatus*, and, as in the latter instance, very thin in substance laterally. The jaw itself is straight, especially the alveolar margin, which is in a line continuous with the *posterior process*.

The canines in the lower jaw are of considerable size, and have a basal lobe behind. They are nearly contiguous, and the incisors, two in number, are placed in front of them as in some species of the genus *Molossus* (*Nyctinomus*), and, as in that genus, are probably lost with age. They are very small, feebly implanted in the jaw, and have their tips trilobed. The next two teeth are of the usual premolar type, such as we find in *Vespertilio* proper, and they are succeeded by the three molars, presenting no marked peculiarities of conformation.

Dentition :—In. $\frac{2}{2}$; Can. $\frac{1-1}{1-1}$; Pre. Mol. $\frac{2-2}{2-2}$; Mol. $\frac{3-3}{3-3}=\frac{14}{14}$.

In the following Table of dimensions, column number 1 has been taken from a large and probably adult specimen in the British Museum, and numbers 2 and 3 from specimens, perhaps not quite adult, in my own collection. The latter one, having all the bones retained, would furnish the more exact dimensions, but that it is probably immature. From it the skull was extracted, from which the above characters have been taken :—

	No. 1.		No. 2.		No. 3.	
	″	‴	″	‴	″	‴
Length of the head and body	2	6	2	4	2	4
——— of the enclosed part of the tail	0	3	0	3	0	3
——— of the free part of the tail	0	3	0	3	0	$2\frac{1}{2}$
——— of the head	1	$0\frac{1}{2}$	0	$11\frac{1}{2}$	0	11
——— of the fore-arm	1	$9\frac{1}{2}$	1	7	1	8
——— of the longest finger	3	0	2	11	2	$11\frac{1}{2}$
——— of the fourth finger	2	6	2	4	2	4
——— of the thumb	0	5	0	$4\frac{1}{2}$	0	4
——— of the tibia	0	8	0	7	0	7
——— of the foot and claws	0	$7\frac{1}{2}$	0	6	0	6
Expanse of wings	12	0	11	10	11	6

The following are the dimensions of the skull extracted from the specimen which has supplied the measurements given in the second column of the above Table :—

	″	‴
Length from the occipital crest to the anterior of the maxillary bones	0	$9\frac{1}{4}$
Breadth across the zygomatic arches	0	5
Length of the nasal bones	0	3
Greatest breadth of the nasal bones	0	$1\frac{1}{4}$
Length of the dentinal series in the upper jaw	0	4
Breadth between the two outer cusps of the two posterior molars	0	$3\frac{1}{2}$
Breadth between the points of the two upper canines	0	$1\frac{1}{2}$
Total length of the lower jaw	0	$6\frac{1}{2}$
Length of the dentinal series in the lower jaw	0	4
Breadth between the outer cusps of the two posterior molars	0	$2\frac{3}{4}$
Breadth between the points of the lower canines	0	1

In summing up the characters of this singular species (as far as is known, the sole representative of the genus), several affinities not usually associated are manifest. Thus in the form of the tail, and the way in which it perforates the interfemoral membrane, it bears strong resemblance to the genus *Taphozous*, whilst the strength and form of the hinder limbs, but more especially the form and implantation of the canine and incisor teeth, would seem to indicate an affinity with the genus *Molossus* (*Nyctinomus*), both of these genera being representatives of the family *Noctilionina*. Again, on examining attentively the forms of the ear and tragus, we shall be struck with the great resemblance which the latter bears to that of some of the examples of the genus *Vespertilio*, and the former, although differing considerably from the ear in *Vespertilio*, bears nevertheless a greater resemblance to it than perhaps to that of any other genus. But there is another peculiarity to which I have already alluded, which is deserving of especial notice—the presence of *four* bony phalanges in the second finger—a peculiarity in which it resembles the *Phyllostomidæ* or Leaf-nosed Bats of the New World, that number being one of their characteristics ; whilst in all the Old World genera,

with the exception of the one now under notice, we find that that finger has only *three* bony phalanges*. There are, however, several characters present which appear to belong exclusively to the present genus, such as the form of the snout and nostrils, the singular markings on some of the membranes, and the peculiar quality of the fur.

EXPLANATION OF PLATE LIV.

Fig. 1. *Mystacina tuberculata*, three-fourths of the natural size.
a. Head of the same, of the natural size.
b & *c*. Cranium of the same, of the natural size.
d. Magnified representation of the front teeth of the same.
Fig. 2. Magnified representation of the front teeth of *Nyctinomus dilatatus*, showing the resemblance between them and the same parts in *Mystacina tuberculata*.

3. On the Jamaican Cyclotus, and the Description of Twenty-one proposed New Species and Eight New Varieties of that Subgenus from Jamaica By the Hon. Edward Chitty.

Before entering upon the task of description, it seems advisable to offer a few observations upon the difficulty which has hitherto surrounded this group of *Cyclostomidæ* inhabiting Jamaica.

The late Professor C. B. Adams, in Contr. to Conch., No. 8, p. 140, *et seq.* wrote an article upon it; and although the required study enabled him to add seven new species to the former Jamaican list, a perusal of his paper will show that he laboured under great doubts and without clear satisfaction as to the result. The fact is, that almost all the species in the Jam. Cat. of Adams†, 1851, from No. 68 (for *C. Duffianus*, No. 67, is not a Jamaican, but a South American species—*fide* Adams and Mr. Bland, who found duplicates in South America), to No. 77 inclusive, run so much into one another in outward form of the mere shells, *wanting the opercula*, that it is next to impossible to classify them. There is also the difficulty of young and old shells intermingled, which, as regards some of the species, renders the "confusion worse confounded," particularly in the young of *C. Jamaicensis*, and the more mature of *C. crassus*.

The group in question, and many others, lead me to the firm conviction that, unless the differences are very marked, a single specimen

* A similar peculiarity occurs in the genus *Centurio*, which, when first described by Dr. Gray, was thought to be a native of the Old World, but there was some doubt as to the exact locality from which it had been received. But other examples have been since obtained from the New World, and its near alliance with the tailless *Phyllostomidæ* satisfactorily established. The existence therefore of *four* phalanges in this finger in *Centurio* cannot be considered, as in *Mystacina*, as an exception to a general rule, but on the contrary as a further extension of it.

† Whenever the name "Adams" is mentioned in these communications, the late Professor C. B. Adams, of Amherst College, America, is referred to, unless otherwise specified.